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PROTOCHORDATA

TOGETHER WITH

POGONOPHORA, ENTEROPNEUSTA, GRAPTOLITHINA, PTEROBRANCHIA AND PHORONIDEA

COMPILED BY

D. B. CARLISLE, D.Sc.

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Reviews.—Ascidiacea : embryology, REVERBERI; metamorphosis, LYNCH; Thaliacea : *Salpa*, BERRILL.

Collections.—Ascidiacea : Alaska, ABBOTT; Mozambique, MILLAR (2); New Caledonia, TOKIOKA (1); Thaliacea : southern spp. of *Salpa*, FOXTON.

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Order Thecanephria

Polybrachiidae

Diplobrachia, SOUTHWARD (2), tentacles, IVANOV (3, 4) ; *D. capillaris*, SOUTHWARD (2).

Galathealinum, revised diagnosis, IVANOV (1), HARTMAN ; *G. brachiosum* **sp. nov.** Canada, Oregon, E. Pacific, IVANOV (1) pp. 1378–1384 figs. 1–6 ; *G. bruuni*, IVANOV (1).

Heptabrachia, IVANOV (4) ; *H.* spp. nondescript, E. Indies, SOUTHWARD (2) ; *H. abyssicola*, *H. beringensis*, *H. gracilis*, *H. subtilis*, SOUTHWARD (1) ; *H. gracilis*, SOUTHWARD (2) ; *H. talboti* **sp. nov.** S. Africa, Atlantic, depth 1,097–2,890 m, SOUTHWARD (1) pp. 47–52 figs. 1, 2.

Polybrachia annulata, genital system, IVANOV (2) ; *P. capillaris*=*Diplobrachia capillaris*, SOUTHWARD (2) ; *P. celebensis* **sp. nov.** E. Indies, depth 462 m, SOUTHWARD (2) pp. 15–16 fig. 9.

Sclerolinum **gen. nov.** SOUTHWARD (2) pp. 16–18, genotype *S. sibogae*, IVANOV (4) ; *S. sibogae* **sp. nov.** E. Indies, depth 460–1,900 m, SOUTHWARD (2) pp. 16–18 fig. 10.

Zenkevitchiana, IVANOV (4), SOUTHWARD (2).

Lamellisabellidae

Lamellisabella ivanovi **sp. nov.** Gulf of Panama, depth 3,000 m, KIRKEGAARD (1) pp. 8–10 figs. 1, 2, 3b ; *L. johanssoni*, KIRKEGAARD (1) ; *L. zachsi*, KIRKEGAARD (1), genital system, IVANOV (2).

Spirobrachiidae

Spirobrachia and origin of vertebrates, VANDEL ; *S. grandis*, ovarian vessels, spermatophores, IVANOV (2).

PHYLUM PHORONIDEA

Phoronidae

Phoronis and origin of vertebrates, VANDEL ; *P. architecta*, Florida, density, breeding, actinotroch larva, PAINE ; *P. hippocrepia*, EALES, selection of substratum, *P. ovalis*, intraspecific competition, KNIGHT-JONES & MOYSE.

PHYLUM HEMICHORDATA

Class PTEROBRANCHIA

and origin of vertebrates, VANDEL.

Rhabdopleuridae

Rhabdopleura, KOZŁOWSKI (**1**), stomochord, VANDEL; *R.* sp. fossil, U. Cretaceous, Poland, KOZŁOWSKI (**3**); *R. grimaldi*, *R. manubialis*, type specimens catalogued under Bryozoa, BELLOC; *R. normani*, KOZŁOWSKI (**2, 3**), compared with graptolites, ANDRES; *R.* †*vistulae* sp. nov. U. Cretaceous, Poland, KOZŁOWSKI (**2**) pp. 8–14, pl. 1 figs. 1–8, pl. 2 figs. 1–6, pl. 3 figs. 1–14, text-fig. 1. †*Rhabdopleuroides* **gen. nov.** Ordovician, Poland, KOZŁOWSKI (**1**) p. 4, genotype, *R. expectatus*; *R. expectatus* **sp. nov.** mid- to late Ordovician, Poland, KOZŁOWSKI (**1**) pp. 4–12 figs. 1–3.

Cephalodiscidae

Cephalodiscus compared with graptolites, ANDRES, intraspecific competition, KNIGHT-JONES & MOYSE, stomochord, VANDEL.

Class †GRAPTOLITHINA

The classification used is that of BULMAN (1955).

Incertae sedis

Hedrograptus janischewskyi, Silurian, Urals, RUSSIA (**2**).

Protovirgularia nereitarum not a graptolite but track of an arthropod, *P. dichotoma*, VOLK.

Triplograpsus nereitarum = *Protovirgularia nereitarum*, *v.s.*, VOLK.

Order Dendroidea

Dendrograptidae

Aspidograptus **sp. nov.** [unnamed] Tremadocian, Germany, SDZUY pp. 229–230, pl. 1 fig. 1, pl. 2 fig. 6; *A.* ? *minor*, *A. obuti*, *A.* ? *parallelus*, SDZUY.

Dendrograptus sp. KOZŁOWSKI (**1**); *D.* sp. fig'd, Silurian, W. Morocco, ROUSSELLE.

Dictyonema sp., KOZŁOWSKI (**1**); *D.* sp., Ordovician, China, LEE; *D.* sp., Silurian, W. Morocco, ROUSSELLE; *D. anglicum*, OBUT; *D.* cf. *asiaticum*, Ordovician, China, LEE; *D. flabelliforme*, OBUT, SDZUY; *D. graptolithinum*, OBUT; *D. inexpectatum* **sp. nov.**, Tremadoc, Urals, OBUT, p. 148, pl. 1 fig. 6; *D. orientalis*, OBUT; *D. pulchellum*, first record for New Zealand, Ordovician, SKWARKO; *D. regulare* fig'd, Silurian, W. Morocco, ROUSSELLE; *D. rossicum*, OBUT; *D. uralense* **sp. nov.** Tremadoc, Urals, OBUT pp. 146–148, pl. 1 figs. 1–5B.

Rhizograpsus, proposed validation of emendation to *Rhizograptus*, *R. bulbosus* type of *Rhizograptus*, BULMAN (**1**).

Rhizograptus, proposed validation and inclusion in official list of generic names, genotype *Rhizograpsus* [sic] *bulbosus*, BULMAN (**1**).

Anisograptidae

Intermediate between Dendroidea and Graptoloidea, BULMAN (**2**).

Adelograptus sp., Poultney Slate, Ordovician, New York, BERRY; *A.* cf. *antiquus*, Ordovician, New Zealand, SKWARKO; *A.* aff. *divergens*, *A.* aff. *pauxillus*, Poultney Slate, Ordovician, New York, BERRY.

Anisograptus zone, BERRY.

Byrograptus [sic] *hunnebergensis*, Ordovician, New Zealand, SKWARKO.

Clonograpsus, proposed validation of emendation to *Clonograptus*, BULMAN (**1**).

Clonograptus, proposed validation and inclusion in official list of generic names, genotype *Graptolithus rigidus*, BULMAN (**1**); *C.* zone, *C.* sp., *C. flexilis*, *C.* cf. *milesi*, *C.* cf. *tenellus*, *C.* cf. *timidus*, Poultney Slate, Ordovician, New York, BERRY; *C.* cf. *rigidus*, Ordovician, New Zealand, SKWARKO.

Graptolithus rigidus genotype of *Clonograptus*, BULMAN (**1**).

Staurograpsus, proposed validation of emendation to *Staurograptus*, *S. dichotomous* genotype of *Staurograptus*, BULMAN (**1**).

Staurograptus, proposed validation and inclusion in official list of generic names, genotype *Staurograpsus* [sic] *dichotomous*, BULMAN (**1**).

Acanthograptidae

Proposed inclusion in official list of Family-group names, type genus *Acanthograptus*, BULMAN (**1**).

Acanthograpsus, proposed validation of emendation to *Acanthograptus*, *A. granti* genotype of *Acanthograptus*, BULMAN (**1**).

Acanthograptus, proposed validation and inclusion in official list of generic names, genotype *Acanthograpsus* [sic] *granti*, BULMAN (**1**); *A.* sp., KOZŁOWSKI; *A.* sp. Ordovician, China, LEE.

Ptilograptidae

Ptilograptus, SDZUY.

Chaunograptidae

Haplograptus canadensis, Ordovician, China, LEE.

Mastigograptus spp., Ordovician, Berlin, structure compared with fossil and recent Hemichordata, ANDRES.

Order Tuboidea

Tubidendridae

Tubidendrum bulmani compared with *Mastigograptus*, ANDRES.

Idiotubidae

Calyptograpsus, proposed validation of emendation to *Calyptograptus*, *C. cyathiformis* genotype of *Calyptograptus*, BULMAN (**1**).

Calyptograptus, proposed validation and inclusion in official list of generic names, genotype *Calyptograpsus* [sic] *cyathiformis*, BULMAN (1).

Conitubus siculoides compared with *Mastigograptus*, ANDRES.

Epigraptus, ANDRES.

Idiotubus compared with *Mastigograptus*, ANDRES.

Kystodendron longicarpus, KOZLOWSKI (1).

Order Stolonoidea

Stolonodendridae

Stolonodendrum compared with *Mastigograptus*, ANDRES.

Order Graptoloidea

Dichograptidae

Proposed inclusion in official list of family-group names, type *Dichograptus*, BULMAN (1).

Azygograptus, Sweden, SKOGLUND ; *A. coelebs*, *A. falciformis*=*A. fasciculatus*, redesc'd and fig'd, Ordovician, *Didymograptus bifidus* zone of Ebbe anticline, Germany, JENTSCH & STEIN ; *A. suecicus*, mid-Ordovician, China, *A. s.* zone=*Didymograptus hirundo* zone, LEE.

Dichograpsus proposed suppression, *D. sedgwickii* type of *Dichograptus* BULMAN (1).

Dichograptus type of family, proposed inclusion in official list of generic names, genotype *Dichograpsus* [sic] *sedgwickii*, BULMAN (1) ; *D.* sp. Ordovician, Poultney Slate, New York, BERRY ; *D. erectus* **sp. nov.** L. Ordovician, China, LEE pp. 51, 67–68, pl. 1 fig. 2 ; *D.* cf. *maccoyi*, Ordovician, Poultney Slate, New York, BERRY ; *D. octobrachiatus*, Ordovician, Poultney Slate, New York, BERRY ; New Zealand, SKWARKO ; *D. octonarius*, LEE.

Didymograpsus, proposed validation of emendation to *Didymograptus*, *D. elegans*, type of *Dicellograptus*, BULMAN (1).

Didymograptus, proposed validation and inclusion in official list of generic names, genotype *Graptolithus murchisoni*, BULMAN (1) ; *D.* sp. Sweden, SKOGLUND ; *D.* sp. M. Ordovician, W. Australia, TOMLINSON ; *D.* ? sp. Ordovician, Poultney Slate, New York, BERRY ; *D. abnormis*, *D. a.* zone, L. Ordovician, China, LEE ; *D. acutidens*, L. Ordovician, Germany, JENTSCH & STEIN; *D. affinis*, OBUT; *D.* cf. *affinis*, *D.* cf. *artus*, L. Ordovician, Germany, JENTSCH & STEIN ; *D. asperus*, M. Ordovician, China, LEE; *D.* cf. *asperus*, first records for New Zealand, SKWARKO ; *D. bifidus* zone, New York, BERRY, Germany, JENTSCH & STEIN ; *D. callotheca*, *D. denticulatus*, L. Ordovician, Germany, JENTSCH & STEIN ; *D. ensjoensis*, *D. extensus* Ordovician, Poultney Slate, New York, BERRY ; *D. extensus*, *D. e.-nitidus*, Ordovician, New Zealand, SKWARKO ; *D. fasciculatus*=*Azygograptus f.* q.v., JENTSCH & STEIN ; *D.* ? *formosus*, SKOGLUND ; *D.* aff. *geometricus*, OBUT ; *D. hirundo* zone, China, LEE ; *D. klotschichnini* **sp. nov.** Tremadoc, Urals, OBUT pp. 148–149 pl. 1 figs. 7, 7A; *D. leptograptoides*, JENTSCH & STEIN; *D. lofuensis* **sp. nov.** S. Kueichow, China, *D. abnormis* zone of L. Ordovician, LEE pp. 59, 72, pl. 1 figs. 3a–3c, text-fig. 10 ; *D.* cf. *missilis*, Ordovician, New Zealand, SKWARKO ; *D. murchisoni*, JENTSCH & STEIN, *D. m.* zone, China, LEE ; *D. nicholsoni*, OBUT, Ordovician, China, LEE ; *D. nitidus*, Ordovician, Poultney Slate, New York, BERRY ; *D.* cf. *n.*, Ordovician, New Zealand, SKWARKO ; *D.* cf. *patulus*, *D. protobifidus*, *D. p.* zone, Ordovician, Poultney Slate, New York, BERRY ; *D. similis*, Ordovician, China, LEE ; *D. stabilis*, JENTSCH & STEIN ; *D.* aff. *validus*, Ordovician, Poultney Slate, New York, BERRY.

Goniograptus thureaui, Ordovician, New Zealand, SKWARKO.

Graptolithus bryonoides genotype of *Tetragraptus*, *G. murchisoni* genotype of *Didymograptus*, BULMAN (1).

Holmograptus, Sweden, SKOGLUND ; *H. callotheca*, KOZLOWSKI (1).

Isograptus zone, BERRY ; *I. caduceus divergens*, *I. c. lunata*, *I. c. maximo-divergens*, *I. c. victoriae*, Ordovician, New Zealand, SKWARKO ; *I. forcipiformis harrisi* **var. nov.** N.W. Nelson, New Zealand, Ordovician, SKWARKO p. 106 fig. 4 ; *I. geberulus*, LEE ; *I. hastatus*, Ordovician, New Zealand, SKWARKO.

Janograptus, Sweden, SKOGLUND ; *J.* sp. Ordovician, Germany, JENTSCH & STEIN ; *J. dawanensis* **sp. nov.** Ordovician, China (W. Hupeh), LEE pp. 61, 73–74, text-fig. 13.

Kinegraptus **gen. nov.** L. Ordovician, SKOGLUND pp. 391–392, genotype *K. kinnekullensis* ; *K. kinnekullensis* **sp. nov.** L. Ordovician, Sweden (Västergötland) SKOGLUND pp. 392–397 pl. 1 figs. 1–6, text-figs. 1–4 ; *K. multiramosus* **sp. nov.** L. Ordovician, Sweden (Västergötland) SKOGLUND pp. 397–400 pl. 1 figs. 7–10, text-figs. 5–7.

Nicholsongraptus junior subjective synonym of *Azygograptus*, *N. fasciculatus*=*A. f.*, JENTSCH & STEIN.

Phyllograptus sp. Ordovician, Germany, JENTSCH & STEIN, Sweden, SKOGLUND ; *P. angustifolius*, M. Ordovician, China, LEE ; *P. a. elongatus* zone, Sweden, SKOGLUND ; *P. anna*, M. Ordovician, China, LEE, New Zealand, SKWARKO ; *P. densus* zone, Sweden, SKOGLUND ; *P. ilicifolius*, Ordovician, China, LEE.

Tetragrapsus, proposed validation of emendation to *Tetragraptus*, BULMAN (1).

Tetragraptus, proposed validation and inclusion in official list of generic names, genotype *Graptolithus bryonoides*, BULMAN (1) ; *T.* Sweden, SKOGLUND ; *T.* sp. Poultney Slate, Ordovician, New York, BERRY ; *T. amii* L. Ordovician, China, LEE ; *T. approximatus*, Poultney Slate, Ordovician, New York, BERRY, New Zealand, SKWARKO ; *T. bigsbyi*, *T.* aff. *bigsbyi*, M. Ordovician, China, LEE ; *T. decipiens*, Ordovician, New Zealand, SKWARKO ; *T. fructicosus*, *T. f.* zones, Poultney Slate, Ordovician, New York, BERRY, New Zealand, SKWARKO ; *T.* aff. *harti* M. Ordovician, China, LEE ; *T. quadibrachiatus*, Poultney Slate, Ordovician, New York, BERRY ; *T.* aff. *q.* Arenigian,

W. Australia, TOMLINSON; *T. reclinatus*, M. Ordovician, China, LEE; *T. serra*, M. Ordovician, China, LEE; *T.* aff. *serra*, *T. whitelawi*, New Zealand, SKWARKO.

Corynoididae

Corynoides, ANDRES.

Cryptograptidae

Cryptograptus tricornis, Poultney Slate, New York, BERRY.

Glossograpsus, proposed validation of emendation to *Glossograptus*, *G. ciliatus* genotype of *Glossograptus*, BULMAN (1).

Glossograptus, proposed validation and inclusion in official list of generic names, genotype *Glossograpsus* [sic] *ciliatus*, BULMAN (1); *G.* ? sp. M. Ordovician, W. Australia, TOMLINSON.

Leptograptidae

Cladograpsus linearis genotype of *Pleurograptus*, BULMAN (1); *C. nereitarum*=*Protovirgularia n.*, not a graptolite but track of an arthropod, VOLK.

Clematograpsus implicatus, SDZUY.

Leptograptus sp. Poultney Slate, Ordovician, New York, BERRY.

Nemagrapsus, proposed validation of emendation to *Nemagraptus*, *N. elegans* genotype of *Nemagraptus*, BULMAN (1).

Nemagraptus, proposed validation and inclusion in official list of generic names, genotype *Nemagrapsus elegans*, BULMAN (1); *N. gracilis* zone, BERRY.

Pleurograpsus, proposed validation of emendation to *Pleurograptus*, BULMAN (1).

Pleurograptus, proposed validation and inclusion in official list of generic names, genotype *Cladograpsus* [sic] *linearis*, BULMAN (1).

Dicranograptidae

Dicellograpsus, proposed validation of emendation to *Dicellograptus*, BULMAN (1).

Dicellograptus, proposed validation and inclusion in official list of generic names, genotype *Didymograpsus* [sic] *elegans*, BULMAN (1), phylogeny, BULMAN (2); *D. complanatus* zone, *D. divaricatus salopiensis*, Poultney Slate, Ordovician, New York, BERRY.

Dicranograptus, phylogeny, intermediate between *Dicellograptus* and *Diplograptus*, BULMAN (2).

Diplograptidae

Proposed inclusion in official list of family-group names, type *Diplograptus*, BULMAN (1); phylogeny, BULMAN (2).

Amplexograptus see also *Diplograptus*; *A.* sp. M. Ordovician, W. Australia, TOMLINSON; *A.* aff. *perexcavatus*, Poultney Slate, New York, BERRY.

Cephalograpsus, proposed validation of emendation to *Cephalograptus*, BULMAN (1).

Cephalograptus, proposed validation and inclusion in official list of generic names, genotype *Diplograpsus* [sic] *cometa*, BULMAN (1).

Climacograptus sp. Poultney Slate, Ordovician, New York, BERRY; *C.* sp., KOZLOWSKI; *C.* sp. Llandoverian, Paraguay, WOLFART; *C. bicornis* zone, BERRY; *C. innotatus brasiliensis*, Llandoverian, Paraguay, WOLFART; *C. phylophorus*, Poultney Slate, New York, BERRY; *C. rectangularis*, *C. scalaris normalis*, *C. s. s.* Silurian, Portugal, ROMARIZ; *C. s. normalis*, KHALETSKAYA.

Cystograptus samarcandicus **sp. nov.** Samarkand (Central Asia), Silurian, KHALETSKAYA pp. 374–375 pl. 25 fig. 4.

Diplograpsis, proposed validation of emendation to *Diplograptus*, BULMAN (1).

Diplograpsus, proposed suppression, *D. cometa* genotype of *Cephalograptus*, BULMAN (1).

Diplograptus, proposed validation and inclusion in official list of generic names, genotype *Prionotus pristis*, BULMAN (1); phylogeny, BULMAN (2); *D.* sp. Llandoverian, Paraguay, WOLFART; *D.* (*Amplexograptus*) cf. *confertus*, *D.* (*Glyptograptus*) cf. *dentatus*, L. Ordovician, Germany, JENTSCH & STEIN; *D. magnus*, Silurian, Portugal, ROMARIZ.

Glyptograptus, see also *Diplograptus*; *G.* ? sp. M. Ordovician, W. Australia, TOMLINSON; *G. dentatus*, phylogeny, BULMAN (2); *G. euglyphus pygmaeus*, Ordovician, Poultney Slate, New York, BERRY; *G. serratus*, Silurian, Portugal, ROMARIZ; *G. sinodentatus minor* **var. nov.** L. Ordovician, China, LEE pp. 62–63, 74 pl. 2 figs. 7a–e, text-fig. 14, *G. s. m* zone=*Didymograptus murchisoni* zone, LEE; *G. tamariscus tamariscus*, *G. t. incertus*, Silurian, Portugal, ROMARIZ; *G. teretiusculus* zone, BERRY.

Orthograptus, SKOGLUND; *O. gracilis*, KOZLOWSKI (1); *O. mutabilis*, Silurian, Portugal, ROMARIZ; *O. quadrimucronatus* zone, *O. truncatus intermedius* zone, BERRY.

Paraclimacograptus ? *comantis* **sp. nov.** Turkestan, Silurian, KHALETSKAYA p. 374 pl. 25 fig. 5; *P. innotatus occidentalis*, KHALETSKAYA; *P. sinitzini* **sp. nov.** Central Asia, Silurian, KHALETSKAYA pp. 373–374 pl. 25 figs. 6, 7.

Petalolithus ovatus, *P. o. ovatus*, *P. palmeus palmeus*, *P. p. latus*, Silurian, Portugal, ROMARIZ.

Prionotus pristis genotype of *Diplograptus*, BULMAN (1).

Pseudoclimacograptus hughesi, Silurian, Portugal, ROMARIZ.

Trigonograpsus, proposed validation of emendation to *Trigonograptus*, *T. lanceolatus* genotype of *Trigonograptus*, BULMAN (1).

Trigonograptus, proposed validation and inclusion in official list of generic names, genotype *Trigonograpsus* [sic] *lanceolatus*, BULMAN (1); *T. ensiformis*, M. Ordovician, China, LEE, first record for New Zealand, SKWARKO.

Lasiograptidae

Hallograptus etheridgei zone, BERRY.

Retiolitidae

Petiolites [sic] *angustidens*, Silurian, Urals, RUSSIA (2).

Retiolites (" *Gothograptus* ") *spinosus* fig'd, Silurian, W. Morocco, ROUSSELLE.

Stomatograptus, Silurian, Urals, RUSSIA (2).

Dimorphograptidae

Akidograptus ascensus, KHALETSKAYA ; *A. cuneatus* **sp. nov.** Silurian, Central Asia, KHALETSKAYA p. 375 pl. 25 fig. 8.

Dimorphograptus, phylogeny, BULMAN (2).

Rhaphidograptus tornquisti, Silurian, Portugal, ROMARIZ.

Cyrtograptidae

Proposed inclusion in official list of family-group names, type genus *Cyrtograptus*, BULMAN (1).

Cyrtograpsus, proposed suppression, *C. murchisoni* genotype of *Cyrtograptus*, BULMAN (1).

Cyrtograptus, proposed inclusion in official list of generic names, genotype *Cyrtograpsus* [sic] *murchisoni*, BULMAN (1) ; phylogeny, BULMAN (2) ; *C.*, JENTSCH & STEIN ; *C. pseudocarruthersi* fig'd, Silurian, W. Morocco, ROUSSELLE ; *C. radians*, Silurian, Urals, RUSSIA (2).

Monograptidae

Abiesgraptus tenuiramosus, Silurian, Morocco, HOLLARD & WILLEFERT.

Demirastrites convolutus, *D. pectinatus similis*, *D. p. p.*, *D. triangulatus triangulatus*, *D. t. major*, Silurian, Portugal, ROMARIZ ; *D. t.*, Silurian, Urals, RUSSIA (2).

Linograptus, JENTSCH & STEIN ; *L. posthumus*, Silurian, Morocco, ROUSSELLE, HOLLARD & WILLEFERT.

Mediograptus intermedius, Silurian, Portugal, ROMARIZ.

Monograptus, JENTSCH & STEIN, phylogeny, BULMAN (2) ; *M. angustidens*, HOLLARD & WILLEFERT ; *M. bohemicus*, L. Ludlovian, Illinois, Ross, fig'd, Silurian, W. Morocco, ROUSSELLE ; *M. butovicensis*, *M. chimaera*, L. Ludlovian, Illinois, Ross ; *M. c.*, *M. c. salweyi*, *M. c. semispinosus*, fig'd, W. Morocco, ROUSSELLE ; *M. clingani*, Silurian, Portugal, ROMARIZ ; *M. colonus*, L. Ludlovian, Illinois, Ross ; *M. c.*, *M. c. compactus*, *M. c. ludensis*, *M.* cf. *comis*, *M. concinnus*, *M. contumax*, *M.* (*Spirograptus*) *convexus*, fig'd, Silurian, W. Morocco, ROUSSELLE ; *M. convolutus*, RAASCH *et al.* ; *M. crenularis*, *M. crinitus*, fig'd, Silurian, W. Morocco, ROUSSELLE ; *M. c.*, Urals, RUSSIA (2) ; *M. dubius*, HOLLARD & WILLEFERT, L. Ludlovian, Illinois, Ross ; *M. d*, *M. d. ludlowensis*, *M. d. thuringicus*, *M. elongatus*, fig'd, Silurian, W. Morocco, ROUSSELLE ; *M. exiguus*, Silurian, Yukon, RAASCH *et al.* ; *M. flemingi*, Silurian, Urals, RUSSIA (2) ; *M. fritschi*, *M. galaensis*, *M. gemmatus*, *M. gothlandicus*, *M.* cf. *halli*, fig'd, Silurian, W. Morocco, ROUSSELLE ; *M.* cf. *halli*, Silurian, Yukon, RAASCH *et al.* ; *M. hercynicus*, Silurian, Morocco, HOLLARD & WILLEFERT ; *M. incommodus*, *M. intermedius*, *M. jaculum*, fig'd, Silurian, W. Morocco, ROUSSELLE ; *M. jaekeli*, Silurian, Urals, RUSSIA (2) ; *M. kolednikensis*, Silurian, Morocco, HOLLARD & WILLEFERT, ROUSSELLE ; *M. lobiferus*, Silurian, Portugal, ROMARIZ ; *M. lochkovensis*, Silurian, Morocco, HOLLARD & WILLEFERT ; *M. nilssoni*, fig'd, Silurian, W. Morocco, ROUSSELLE ; *M. priodon*, HOLLARD & WILLEFERT ; *M. p. p.*, Silurian, Portugal, ROMARIZ ; *M. pseudochimaera*, fig'd, Silurian, Morocco, ROUSSELLE ; *M. raitzhainiensis*, Silurian, Portugal, ROMARIZ ; *M. regularis*, fig'd, Silurian, W. Morocco, ROUSSELLE ; *M. riccartonensis* zone, ROMARIZ ; *M. roemeri*, L. Ludlovian, Illinois, Ross, fig'd, W. Morocco, ROUSSELLE ; *M. runcinatus*, Silurian, Yukon, RAASCH *et al.* ; *M. sandersoni*, *M. scanicus*, *M. sedgwicki*, fig'd, Silurian, W. Morocco, ROUSSELLE ; *M. s.*, Portugal, ROMARIZ, Urals, RUSSIA (2) ; *M. similis*, Silurian, Morocco, HOLLARD & WILLEFERT, fig'd, ROUSSELLE ; *M. spiralis*, Silurian, Yukon, RAASCH *et al.* ; *M. subcolonus*, fig'd, Silurian, W. Morocco, ROUSSELLE ; *M. tumescens*, L. Ludlovian, Illinois, Ross, fig'd, W. Morocco, ROUSSELLE ; *M. turriculatus*, Silurian, Yukon, RAASCH *et al.* ; *M.* cf. *ultimus*, Silurian, Morocco, HOLLARD & WILLEFERT ; *M. u.*, *M.* cf. *uncinatus*, *M. uniformis*, fig'd, Silurian, Morocco, ROUSSELLE ; *M. u.*, HOLLARD & WILLEFERT ; *M. varians*, fig'd, Silurian, W. Morocco, ROUSSELLE ; *M. v.*, *M. v. pumilus*, L. Ludlovian, Illinois, Ross ; *M. vulgaris*, fig'd, Silurian, W. Morocco, ROUSSELLE.

Oktavites spiralis, Silurian, Urals, RUSSIA (2).

Pristiograptus gregarius, *P. leptotheca*, Silurian, Portugal, ROMARIZ ; *P.* (*Colonograptus*) *lochkovensis*, fig'd, Silurian, W. Morocco, ROUSSELLE ; *P. ludlowensis*, *P. nudus*, Silurian, Urals, RUSSIA (2) ; *P. n.*, *P. regularis regularis*, Silurian, Portugal, ROMARIZ.

Rastrites approximatus, Silurian, Urals, RUSSIA (2) ; *R. a. a.*, *R. hybridus*, *R. longispinus*, *R. peregrinus*, *R. p. p.*, Silurian, Portugal, ROMARIZ.

Saetograptus leintwardinensis prima, Silurian, Urals, RUSSIA (2).

Spirograptus, see also *Monograptus* ; *S. communis communis*, *S. c. rostratus*, *S. spiralis spiralis*, *S. s. gortani*, *S. turriculatus turriculatus*, Silurian, Portugal, ROMARIZ ; *S. t.* Urals, RUSSIA (2).

Class ENTEROPNEUSTA

and origin of vertebrates, VANDEL.

†*Balanoglossites* sp., fossil faecal casts, MAYER.

Tornaria, detailed study, divided into two groups : *Tornariae ancoratae* (type *T. mielcki*) and *T. scutigerae* (type *T. armauerhanseni*), DAMAS & STIASNY ; *T.*, Singapore Straits, WICKSTEAD ; *T. agassizi*, DAMAS & STIASNY ; *T. armauerhanseni* **sp. nov.** Moroccan Coast, DAMAS & STIASNY Annexe II [p. 66] pl. 1 figs. 1–5, pl. 2 figs. 4–13, text-fig. 5 ; *T. cairnensis*, *T. chierchiai* I=*T. grenacheri*,

T. colmani, *T. delsmanni*, *T. dubia*=*Glandiceps talaboti*, *T. grenacheri*, *T. hubbardi*, *T. krohni*, *T. menoni*, *T. mielcki* type of *Tornariae ancoratae*, detailed study, *T. miyashitai*, *T. morgani*, *T. muelleri*=*Balanoglossus clavigerus*, *T. namajunami*, *T. ritteri*, *T. russelli*, *T. setoensis*, *T. snelliusi*, *T. sunieri*, *T. susakiensis*, *T. tergestina*=*Balanoglossus minutus*, *T. tobagensis*, *T. weldoni*, *T. ymai*, DAMAS & STIASNY.

Harrimaniidae

Dolichoglossus see *Saccoglossus*.

Saccoglossus, attachment of larvae, KNIGHT-JONES & MOYSE ; *S. horsti*, development, DAMAS & STIASNY ; *S. kowalevskii*, uptake of dissolved amino acids, STEPHENS & SCHINSKI, development [as *Dolichoglossus*], DAMAS & STIASNY, regeneration, TWEEDELL ; *S. pusillus* [as *Dolichoglossus*], development, DAMAS & STIASNY ; *S. ruber*, EALES.

Spengeliidae

Glandiceps, tornaria, *G. abyssicola*, *G. stiasnyi*, tornaria, development, tornaria of *G. talaboti* is *T. dubia*, DAMAS & STIASNY.

Schizocardium, tornaria, DAMAS & STIASNY.

Spengelia, tornaria, DAMAS & STIASNY.

Willeyia delagoae, ecology, N. Mozambique, KALK.

Ptychoderidae

Balanoglossus, EALES, VANDEL, Singapore Straits, WICKSTEAD, tornaria, DAMAS & STIASNY ; *B. clavigerus*, development, tornaria is *T. muelleri*+*T. krohni*, DAMAS & STIASNY, regeneration, TWEEDELL ; *B. minutus* tornaria is *T. tergestina*, DAMAS & STIASNY ; *B. misakiensis*, regeneration, TWEEDELL ; *B. studiosorum*, ecology, N. Mozambique, KALK.

Glossobalanus, EALES ; *G. minutus*, tornaria, development, DAMAS & STIASNY, regeneration, TWEEDELL.

Ptychodera, tornaria, DAMAS & STIASNY ; *P. flava*, ecology, N. Mozambique, KALK, regeneration, TWEEDELL.

Class PLANCTOSPHAEROIDEA

No justification for separating from Enteropneusta, DAMAS & STIASNY.

Planctosphaera pelagica, detailed study, differs in no essential from Tornaria, DAMAS & STIASNY.

PHYLUM CHORDATA

Subphylum TUNICATA

and origin of the vertebrates, VANDEL.

Class ASCIDIACEA

Order Enterogona

Clavelinidae

Cellulophana collectrix=*Distaplia bermudensis* q.v., DEKEYSER.

Chelyosoma inaequale redesc'd, fig'd, Alaska, *C. macleayanum*, redesc'd, Alaska, variability, ABBOTT.

Clavelina, metamorphosis, LYNCH ; *C. lepadiformis*, EALES, photographs of larvae, NILSSON & JÄGERSTEN, embryology, REVERBERI, phylogeny of pharynx, STERBA ; *C. l. rissoana*, Ionian Sea, PARENZAN (1), thyroid hormones, SALVATORE *et al.* ; *C. oblonga*, ANDREW (1), Senegal, DEKEYSER, killed by rain, GOODBODY (3) ; *C. picta*, blood cells, ANDREW (1, 2).

Distaplia bermudensis, Antilles, Senegal, DEKEYSER; *D. magnilarva*, locomotion of adult colony, CARLISLE.

Pycnoclavella stanleyi, vanadium, LEVINE (1).

Polycitoridae

Phlebobranch affinities, LEVINE (2).

Cystodytes dellechiajei, locomotion of adult colonies, CARLISLE, Israel, PÉRÈS ; *C. d. typica*, Senegal, Ghana, Cameroons, *C. d. ceylonensis*, Senegal, Mauritania, *C. denudatus*, Senegal, *C. draschei*=*C. dellechiajei*, *C. durus*=*C. dellechiajei*, *C. guineensis*, Ghana, *C. roseolus greeffi*, W. Africa, *C. r. typica*, Senegal, S. Africa, *C. tetrascelifer*, Angola, DEKEYSER.

Eudistoma accrum, Ghana, *E. almadiense*, Senegal, *E. angolanum togoensis*, Togoland, W. Africa, *E. a. typica*=*E. paessleroides angolanum*, DEKEYSER ; *E. caeruleum*, Mozambique, MILLAR (2) ; *E. carolinense* PÉRÈS=*E. ramosum*, *E. clarum*, Senegal, W. Africa, *E. luederitzi*, S.W. Africa, Senegal, DEKEYSER ; *E. moebiusi*, *E. paessleroides*, Mozambique, KALK, MILLAR (2) ; *E. p. hupferi*, Angola, *E. p. intermedia*, Senegal, *E. p. typica*, Ghana, *E. planum*, Senegal, *E. ramosum*, Senegal, Ghana, DEKEYSER ; *E. rhodopyge*, ecology, N. Mozambique, KALK ; *E. ritteri*, titanium, chromium, sulphuric acid in tissues, LEVINE (1) ; phlebobranch affinities, LEVINE (2) ; *E. schultzei dualana*, Cameroons, *E. s. typica*, W. Africa, DEKEYSER.

Polyclinidae

Amaroucium see also *Aplidium* ; *A. accarense*, Ghana, *A. albicans*, *A. a. pseudarenatum*, Senegal, DEKEYSER ; *A. areolatum* [as *Fragarium*], Ionian Sea, PARENZAN (1) ; *A. constellatum*, metamorphosis, LYNCH ; *A. dakarensis*, W. Africa, *A. mauritaniae*, Senegal, Mauritania, DEKEYSER ; *A. stellatum*, uptake of dissolved amino acids, STEPHENS & SCHINSKI ; *A. turbinatum*, Mauritania, DEKEYSER.

Aplidium see also *Amaroucium* ; *A. altarium*, ecology, N. Mozambique, KALK ; *A. a.* Mozambique, *A. astraeoides*=*A. flavo-lineatum*, *A. erythraeum* partim=*A. flavo-lineatum*, *A. f-l.* Mozambique, MILLAR (2) ; *A. lobatum*=*Cystodytes dellechiajei* q.v., DEKEYSER ; *A. lubricum*, Mozambique, MILLAR (2) ; *A. petrense*, Mozambique, KALK, MILLAR (2) ; *A. proliferum*, *A. punctum*, EALES ; *A. simplex*=*A. flavo-lineatum*, MILLAR (2).

Euherdmania australis, MILLAR (3) ; *E. claviformis*, MILLAR (3), vanadium, LEVINE (1) ; *E. c.* PÉRÈS=*E. solida* q.v., DEKEYSER ; *E. rodei*, MILLAR (3), Senegal, DEKEYSER ; *E. solida*, MILLAR (3), Senegal, Ghana, DEKEYSER ; *E. vitrea* **sp. nov.** Brazil, adult and larva, MILLAR (3) pp. 143–147 fig.

Fragarium see *Amaroucium*.

Macroclinum angolanum, Angola, *M. diligens*, W. Africa, *M. durum*, W. Africa, *M. recedens*, W. Africa, *M. senegalense*, Senegal, DEKEYSER.

Morchellium argus, EALES.

Polyclinum, intraspecific competition, KNIGHT-JONES & MOYSE; *P. aurantium*, EALES, ecology, English Channel, CABIOCH, Senegal, DEKEYSER; *P. a. joalensis*, Senegal, Ghana, DEKEYSER; *P. constellatum* adult and larva redesc'd, fig'd, New Caledonia, TOKIOKA (1), settlement inhibited by sponges, GOODBODY (2), killed by rain, GOODBODY (3); *P. insulsum*, *P. macrophyllum*, Mozambique, MILLAR (2); *P. m.* ecology, N. Mozambique, KALK; *P. meandricum*, W. Africa, DEKEYSER; *P. pullum*=*Trididemnum pullum*, MILLAR (2); *P. reticulatum*, W. Africa, DEKEYSER; *P. tsutsui*, TOKIOKA (1).

Pseudodistoma brieni, Senegal, DEKEYSER.

Sidnyum elegans, *S. turbinatum*, EALES.

Didemnidae

Didemnopsis sansibaricum, ecology, N. Mozambique, KALK.

Didemnum albidum, manganese in tissues, LEVINE (1); *D. asperum*, EALES; *D. candidum*, GOODBODY (1), locomotion of adult colony, CARLISLE; *D. c. africana*, Senegal, Ghana, Cameroons, Angola, S.W. Africa, *D. c. trigonostoma*, Ghana, DEKEYSER; *D. canum*, Ionian Sea, PARENZAN (1); *D. cereum*, EALES; *D.* (*Polysyncraton*) *chuni*, MILLAR (2); *D. gelatinosum*, EALES, locomotion of adult colony, CARLISLE; *D. maculosum*, EALES, settlement inhibited by sponges, GOODBODY (2), Ionian Sea, PARENZAN (1), ecology, Ireland, SLOANE *et al.*; *D.* (*Polysyncraton*) *magnilarvum*, Mozambique, MILLAR (2); *D.* (*D.*) *moseleyi* adult and larva redesc'd, fig'd, New Caledonia, TOKIOKA (1); *D.* (*P.*) *paradoxum mahenum*, MILLAR (2); *D. psammatodes*, ecology, N. Mozambique, KALK, *D.* (*P.*) *spongioides*, *D.* (*P.*) *tubiporae*, MILLAR (2).

Diplosoma crystallinum (partim)=*D. listerianum gelatinosum*, *D. gelatinosum-listeri*=*D. listerianum gelatinosum*, DEKEYSER; *D. listeriaum*, EALES, locomotion of adult colony, CARLISLE, predation by nudibranchs, M. C. MILLER, ecology, Ireland, SLOANE *et al.*; *D. l. gelatinosum*, Senegal, Ghana, S.W. Africa, *D. l. koehleri*, W. Africa, DEKEYSER; *D. macdonaldi*, GOODBODY (3), settlement inhibited by sponges, GOODBODY (2), continuous breeding in Jamaica, GOODBODY (1).

Echinoclinum verrilli, Ghana, DEKEYSER.

Leptoclinides africana typica=*Didemnum candidum africana*, DEKEYSER.

Leptoclinum listerianum=*Diplosoma l.* q.v.; *L. albidum*, S. Africa, DEKEYSER.

Lissoclinum marpum, Ghana, DEKEYSER.

Polysyncraton see also *Didemnum*; *P. amethysteum*, Senegal, Ghana, DEKEYSER; *P. magnilarvum* see *Didemnum*.

Pseudodidemnum crystallinum (partim)=*Diplosoma listerianum koehleri*, DEKEYSER.

Tridemnum cerebriforme, Mozambique, *T. cyclops*=*T. cerebriforme*, MILLAR (2); *T. meridionale*, Ghana, DEKEYSER; *T. natalense*=*T. cerebriforme*, MILLAR (2); *T. savignyi*, Senegal, S. Africa, Antilles, DEKEYSER; *T. tenerum*, EALES, locomotion and fusion of adult colonies, CARLISLE.

Diazonidae

Diazona violacea, ecology, English Channel, CABIOCH.

Cionidae

Ciona, LA SPINA, metamorphosis, LYNCH; *C. intestinalis*, EALES, SALVATORE *et al.* (1), photographs, NILSSON & JÄGERSTEN, ultrastructure of sensory vesicle of tadpole, DILLY, locomotion of adult, CARLISLE, fouling in Britain, STUBBINGS, economic uses, ELROI & KOMAROVSKY, tissue culture, SENGEL, manganese in tissues, LEVINE (1), uptake of dissolved amino acids, STEPHENS & SCHINSKI, W. Africa, DEKEYSER, Ionian Sea, PARENZAN (1), Black Sea (Bulgaria), VALKANOV, fertilization, NARBAITZ, tail resorption, CLONEY, embryology, review, REVERBERI, experimental embryology, GORGONE, hybrids, REVERBERI.

Perophoridae

Ecteinascidia turbinata, blood cells, ANDREW (1, 2), Senegal, DEKEYSER, killed by rain, GOODBODY (3).

Perophora africana, Senegal, Ghana, DEKEYSER; *P. bermudensis*, killed by rain, GOODBODY (3); *P. b.*, PÉRÈS=*P. africana*, DEKEYSER; *P. corrugata*, LÜTZEN; *P. listeri*, EALES, Senegal, DEKEYSER, ecology, Italy, ROSSI; *P. orientalis*, blood circulation, EBARA; *P. viridis*, ANDREW.

Corellidae

Corella antarctica=*C. eumyota*, *C. eumyota*, S.W. Africa, DEKEYSER, GOODBODY (1); *C. novarae*=*C. eumyota*, DEKEYSER; *C. parallelogramma*, EALES, VANDEL, experimental embryology, GORGONE.

Rhodosoma turcicum killed by rain, GOODBODY (3).

Ascidiidae

Ascidia sp. larvae in plankton off Singapore, WICKSTEAD, ecology, Italy, VATOVA, Black Sea, VALKANOV, fouling in Britain, STUBBINGS; *A. achimotae*, Ghana, DEKEYSER, *A. aspersa* see *Ascidiella*; *A. atra*, blood cells, ANDREW (1); *A. aximensis*, Ghana, DEKEYSER; *A. callosa* redesc'd, Alaska, variability, ABBOTT, tail resorption, CLONEY; *A. conchilega*, EALES, not parasitized by *Gonophysema*, BRESCIANI & LÜTZEN; *A. gemmata* redesc'd, fig'd, New Caledonia, TOKIOKA (1); *A. incrassata*, Mozambique, MILLAR (2); *A. interrupta*, GOODBODY (1); *A. malaca*, embryology, REVERBERI, GORGONE, hybrids, REVERBERI, development of fragments of virgin eggs, LA SPINA; *A. mentula*, EALES, hybrids, REVERBERI, not parasitized by *Gonophysema*, BRESCIANI & LÜTZEN; *A. nigra*, blood, ANDREW (2), tail resorption, CLONEY, ultrastructure of sensory

vesicle of tadpole, DILLY, metamorphosis, LYNCH, continuous breeding in Jamaica, GOODBODY (1), killed by rain, GOODBODY (3), settlement inhibited by sponges, GOODBODY (2); *A. obliqua*, ABBOTT, not parasitized by *Gonophysema*, BRESCIANI & LÜTZEN; *A. prunum*, ABBOTT; *A. sydneiensis samea* redesc'd, fig'd, New Caledonia, TOKIOKA (1); *A. virginea*, ecology, English Channel, CABIOCH, not parasitized by *Gonophysema*, BRESCIANI & LÜTZEN.

Ascidiella aspersa, EALES, parasitized by *Gonophysema*, BRESCIANI & LÜTZEN, embryology, REVERBERI, GORGONE, hybrids, REVERBERI, Senegal, DEKEYSER, Ionian Sea, PARENZAN (1), Black Sea (Bulgaria), VALKANOV; *A. scabra*, EALES, WALLACE, parasitized by *Gonophysema*, BRESCIANI & LÜTZEN, ecology, Italy, PARENZAN (2); *A. senegalensis*, Senegal, DEKEYSER.

Phallusia, Ionian Sea, PARENZAN (1); *P. julinea*, redesc'd, fig'd, New Caledonia, TOKIOKA (1); *P. mammillata*, EALES, test, ENDEAN, notochord, CLONEY, ultrastructure of sensory vesicle, DILLY, embryology, REVERBERI, GORGONE, hybrids, REVERBERI.

Order Pleurogona

Botryllidae

Allaeocarpa equatorialis, Ghana, DEKEYSER.

Botrylloides, photographs, NILSSON & JÄGERSTEN; *B. leachi*, EALES, locomotion of adult colony, CARLISLE, predation by nudibranchs, M. C. MILLER.

Botryllus, OMMANEY, intraspecific competition, KNIGHT-JONES & MOYSE; *B. aurolineatus*=*B. schlosseri*, PARENZAN (1); *B. gracilis*, adult and larva redesc'd, fig'd, New Caledonia, TOKIOKA (1), *B. niger giganteum*, Senegal, *B. n. magnicoecus*, S.W. Africa, DEKEYSER; *B. planus*, GOODBODY (3), settlement inhibited by sponges, GOODBODY (2); *B. sannio*=*B. schlosseri*, PARENZAN (1); *B. schlosseri*, GOODBODY (1), EALES, photographs, NILSSON & JÄGERSTEN, locomotion of adult colony, CARLISLE, predation by nudibranchs, M. C. MILLER, ecology, English Channel, CABIOCH, Ionian Sea, PARENZAN (1), Black Sea (Bulgaria), VALKANOV, Senegal, DEKEYSER, *situs inversus viscerum* transmitted to buds, SABBADIN; *B. tapetum*, *B. violaceus*=*B. schlosseri*, PARENZAN (1).

Chorizocarpa elegans, S.W. Africa, DEKEYSER.

Distomus hupferi, *D. rudentiformis*, Senegal, DEKEYSER; *D. variolosus*, EALES.

Eusynstyela tincta see *Polyandrocarpa*.

Metrocarpa nigrum, Israel, PÉRÈS.

Polyandrocarpa (*P.*) *rollandi* **sp. nov.** New Caledonia, TOKIOKA (1) pp. 116–118 text-fig. 8 pl. 5 fig. 3; *P.* (*P.*) *r. solitaria* **form. nov.** New Caledonia, TOKIOKA (1) pp. 119–121 text-fig. 9; *P.* (*P.*) *sagamiensis*, TOKIOKA (1); *P.* (*Eusynstyela*) *tincta*, Mozambique, MILLAR (2), Senegal, DEKEYSER, metamorphosis, LYNCH.

Stolonica conglutinata, W. Africa, DEKEYSER; *S. socialis*, ecology, English Channel, CABIOCH.

Symplegma oceanica **sp. nov.** adult and larva, New Caledonia, TOKIOKA (1) pp. 114–116 text-fig. 7; *S. reptans*, TOKIOKA (1); *S. viride*, ANDREW, GOODBODY (3), TOKIOKA (1), continuous breeding in Jamaica, GOODBODY (1), settlement inhibited by sponges, GOODBODY (2), Senegal, Ghana, DEKEYSER, Mozambique, MILLAR (2).

Synstyela incrustans, *S. michaelseni*, *S. monocarpa*, all=*Chorizocarpa elegans* q.v., DEKEYSER.

Styelidae

Cnemidocarpa, LÜTZEN, MONNIOT & MONNIOT; *C. angularis*=*Styela costata* q.v., DEKEYSER; *C. areolata* redesc'd, fig'd, New Caledonia, *C. irma*=*C. a.*, TOKIOKA (1); *C. translucida*, Senegal, DEKEYSER; *C. valborg*=*C. areolata*, TOKIOKA (1).

Dendrodoa grossularia, EALES, LÜTZEN, predation by nudibranchs, M. C. MILLER, ecology, English Channel, CABIOCH.

Dicarpa simplex, ecology, WOLFF.

Katatropa, LÜTZEN.

Pandocia see *Polycarpa*.

Polycarpa, LÜTZEN; *P. angolana*, Angola, *P. arnoldi*, W. Africa, DEKEYSER; *P. aurata clavata*, *P. cryptocarpa*, both redesc'd, fig'd, New Caledonia, TOKIOKA (1), *P. dismatophila*, Ghana, DEKEYSER; *P. fibrosa*, ecology, English Channel, CABIOCH; *P. gorcensis*, Senegal, *P. marioni*, Senegal, DEKEYSER; *P. natalensis*, Mozambique, MILLAR (2); *P. pomaria*, ecology, English Channel, CABIOCH; *P. quadricarpa*, Ghana, DEKEYSER; *P. rubida*, Mozambique, MILLAR (2); *P. rustica*, EALES; *P. souriei*, Senegal, DEKEYSER.

Psammostyela **gen. nov.** Mediterranean, interstitial, genotype *P. delamarei*, WEINSTEIN pp. 1843–1844; *P. delamarei* **sp. nov.** Banyuls, Mediterranean, interstitial form, WEINSTEIN pp. 1843–1844 fig., further description and fig., ecology, MONNIOT & MONNIOT.

Styela, embryology, REVERBERI; *S. aequatorialis*, *S. asymetrica*, S.W. Africa, W. Africa, DEKEYSER; *S. barnharti*, *S. clava*, WALLACE; *S. coriacea*, LÜTZEN; *S. costata*, S.W. Africa, DEKEYSER; *S. cryptocarpa* see *Polycarpa*; *S. gibbsi*, tail resorption, CLONEY; *S. hupferi typica*, Congo, Angola, *S. h. pygmaea*, Angola, DEKEYSER; *S. irma* see *Cnemidocarpa*, TOKIOKA (1); *S. mammiculata*, breeding and development, WALLACE; *S. marquesana*, Mozambique, MILLAR (2); *S. partita*, LÜTZEN, WALLACE, metamorphosis, CLONEY, Mauritania, Senegal, Ghana, DEKEYSER, New Caledonia, TOKIOKA (1); *S. plicata*, LÜTZEN, WALLACE, locomotion of adult, CARLISLE, Ionian Sea, PARENZAN (1), Mauritania, Senegal, DEKEYSER; *S. rectangularis* ?=*S. partita*, TOKIOKA (1); *S. rustica*, reproductive cycle and larval anatomy, LÜTZEN; *S. yakatutensis*, WALLACE.

Pyuridae

Structure of gill-slits, MONNIOT.

Boltenia, MONNIOT & MONNIOT; *B. villosa*, tail resorption, CLONEY (1), changes in ultrastructure of muscle at metamorphosis, CLONEY (2).

Bolteniopsis, MONNIOT & MONNIOT.

Cratostigma **gen. nov.** MONNIOT & MONNIOT p. 276 [genotype by page precedence *Caesira singularis*] ; gill-slits, MONNIOT ; *C. gravellophila*, gill-slits, MONNIOT, redesc'd, fig'd, diagnosis, ecology, MONNIOT & MONNIOT.

Ctenyura, gill-slits, MONNIOT.

Culeolus, MONNIOT & MONNIOT, OMMANEY.

Cynthia see *Halocynthia*.

Eupera, MONNIOT & MONNIOT.

Halocynthia, MONNIOT, ecology, Italy, PARENZAN (1) ; *H. papillosa*, gill-slits, MONNIOT, Monaco, CARPINE, Israel, PÉRÈS ; ecology, Italy, ROSSI ; *H. roretzi*, metamorphosis, HIRAI.

Hartmeyeria, MONNIOT & MONNIOT, gill-slits, MONNIOT.

Herdmania momus, Mozambique, KALK, MILLAR (2), redesc'd, fig'd, New Caledonia, TOKIOKA (1), killed by rain, GOODBODY (3).

Heterostigma, systematic position, diagnosis, MONNIOT & MONNIOT, gill-slits, MONNIOT ; *H. fagei* **sp. nov.** Banyuls, Mediterranean, interstitial form, ecology, MONNIOT & MONNIOT pp. 270–273 figs. 1B, 2, 4 pls. 1–3, gill-slits, MONNIOT ; *H. gravellophila*=*Cratostigma g.* q.v., *H. separ*, *H. singularis*=*Cratostigma s.* q.v., MONNIOT & MONNIOT.

Microcosmus, gill-slits, MONNIOT ; *M. claudicans*, parasites, MONNIOT (2), ecology, English Channel, CABIOCH ; *M. exasperatus*, TOKIOKA (1), killed by rain, GOODBODY (3), Ghana, DEKEYSER ; *M. glacialis*, manganese in tissues, LEVINE ; *M. hartmeyeri*, TOKIOKA (1) ; *M. kura*, GOODBODY (1) ; *M. microcosmus*, SEBASTIO ; *M.* aff. *multiplicatus* desc'd, fig'd, New Caledonia, TOKIOKA (1) ; *M. non-sulcatus* Hartmeyer=*M. senegalensis*, *M. pedunculatus*, Senegal, DEKEYSER ; *M. polymorphus*, parasites, MONNIOT (2) ; *M. sabatieri*, SEBASTIO, parasites, MONNIOT (2) ; *M. scrotum*, SEBASTIO ; *M. senegalensis*, Senegal, DEKEYSER ; *M. sulcatus*, FOUQUE, ecology, Italy, ROSSI ; *M. s. polimorphus* [sic], ascorbic acid levels, SEBASTIO ; *M. vulgaris*, SEBASTIO, gill-slits, MONNIOT, parasites, MONNIOT (2).

Pyura, *P. comma*, gill-slits, MONNIOT ; *P. haustor*, tail resorption, CLONEY ; *P. hupferi*, Senegal, *P. lignosa cerastes*, Ghana, DEKEYSER; *P. microcosmus*, gill-slits, MONNIOT ; *P. sansibarica*, Mozambique, MILLAR (2), W. Africa, *P. s. guineensis*, W. Africa, DEKEYSER ; *P. savignyi*, ecology, English Channel, CABIOCH, N.W. Africa, *P. squamata*, Senegal, DEKEYSER ; *P. stolonifera*, ENDEAN, metals in tissues, LEVINE, Mozambique, MILLAR (2) ; *P. tessellata*, ecology, English Channel, CABIOCH ; *P. violacea*, Senegal, DEKEYSER ; *P. vittata*, Marseille, first record from Mediterranean, FOUQUE, Senegal, Mauritania, DEKEYSER.

Molgulidae

Gill-slits, MONNIOT.

Caesira singularis = *Cratostigma singularis* [Pyuridae] [genotype by page precedence], MONNIOT & MONNIOT.

Ctenicella see also *Molgula* ; *C. hupferi*, Senegal, DEKEYSER.

Eugyra, MONNIOT & MONNIOT ; *E. dakarensis*, Senegal, DEKEYSER.

Molgula, Ionian Sea, PARENZAN (1) ; *M. africana*=*M. kophameli*, DEKEYSER ; *M. citrina*, EALES ; *M. euprocta*, Black Sea (Bulgaria), VALKANOV ; *M. hannensis*, Senegal, *M. kophameli*, W. Africa, DEKEYSER ; *M. manhattensis*, metals in tissues, LEVINE, Chespeake Bay, U.S.A., PFITZENMEYER, uptake of dissolved amino acids, STEPHENS & SCHINSKI ; *M. monodi*, Senegal, DEKEYSER ; *M. oculata*, EALES ; *M. occidentalis*, Mauritania, Ghana, DEKEYSER, *M. ompura* [sic], Black Sea (Bulgaria), VALKANOV.

Molgulina celata, Ghana, Angola, *M. heydemanni*, S.W. Africa, DEKEYSER.

Class THALIACEA

Diphyletic, GODEAUX.

Order Pyrosomatida

Pyrosomatidae

Phylogeny, GODEAUX.

Propyrosoma **gen. nov.** to include the *Pyrosomata fixata*, IVANOVA-KAZAS p. 496 [genotype by page precedence : *Pyrosoma agassizi*] ; see also *Pyrosoma* ; *P. agassizi*, *P. spinosum*, *P. vitjasi*, embryology, IVANOVA-KAZAS.

Pyrosoma, CARLISLE, OMMANEY, luminescence, NICOL ; *P. agassizi*=*Propyrosoma a.* [genotype by page precedence], IVANOVA-KAZAS ; *P. aherniosum*, W. Africa, DEKEYSER ; *P. atlanticum*, ecology, New Zealand, abundance, food of fish, BARY, aelaeoblast, GODEAUX, ecology, Bay of Bengal, NAGABHUSHANAM, W. Africa, DEKEYSER ; *P. spinosum*=*Propyrosoma s.*, IVANOVA-KAZAS, New Zealand, BARY ; *P. vitjasi*=*Propyrosoma v.*, IVANOVA-KAZAS, aelaeoblast, GODEAUX.

Order Doliolida

Doliolidae

Unrelated to other Thaliacea, GODEAUX.

Dolioletta chuni, BARY ; *D. gegenbauri*, BARY, caudal vesicle, GODEAUX, British Isles, annual cycle, GLOVER & BARNES (1, 2), N.E. Atlantic, " oceanic " distribution, COLEBROOK *et al.*, seasonal variation in N.E. Atlantic, CORLETT, W. of Hebrides, FRASER (2), W. Africa, DEKEYSER ; *D. g. tritonis*, TERRY, N.E. Atlantic, " oceanic " distribution, BARNES, ecology, Japan, HIROTA ; *D. mirabilis*, *D. tritonis*, *D. valdiviae*, New Zealand, redesc'd, fig'd, old nurse identified, BARY.

*Doliolina mueller*i, BARY, caudal vesicle of larva, GODEAUX, N.E. Atlantic, " oceanic " distribution, BARNES, COLEBROOK *et al.*

Dolioloides rarum, caudal vesicle of larva, GODEAUX, W. Africa, DEKEYSER.

Doliolum sp. Norwegian current, PAVSHTIKS & GRUSOV, nervous system, BONE ; *D. denticulatum*, BARY, TERRY, temperature dependence, BERNER & REID, RADOVICH, caudal vesicle, GODEAUX, W. Africa, DEKEYSER, Singapore, WICKSTEAD ; *D. gegenbauri* see *Dolioletta* ; *D. muelleri* see *Doliolina* ; *D. nationalis*, phorozoiid desc'd, fig'd, N.W. Atlantic, TERRY, N.E. Atlantic, " oceanic " distribution, BARNES, COLEBROOK *et al.*, W. Africa, DEKEYSER ; *D. rarum* see *Dolioloides*.

Order Salpida

Phylogeny, GODEAUX.

Salpidae

Biphora depressa and *B. tricuspidata* both=*Salpa fusiformis*, FOXTON.

Cyclosalpa affinis, BERRILL ; *C. floridana*, W. Africa, DEKEYSER ; *C. pinnata*, BERRILL ; *C. virgula*, W. Africa, DEKEYSER.

Iasis zonaria, British Isles, GLOVER & BARNES (1), W. of Scotland, FRASER (4), N.E. Atlantic " oceanic " distribution, BARNES, COLEBROOK *et al.* ; ecology, Bay of Bengal, NAGABHUSHANAM, ecology, New Zealand, BARY.

Ihlea asymetrica, British Isles, GLOVER & BARNES, N.E. Atlantic " oceanic " distribution, BARNES, COLEBROOK *et al.* ; *I. magalhanica*, ecology, New Zealand, BARY, Heard Is., Antarctica, EALEY & CHITTLEBOROUGH.

Pegea confoederata, N.W. of Orkney, FRASER (4), New Zealand, BARY.

Salpa, OMMANEY, revision, biometrics, key to southern spp., FOXTON ; *S. africana*, see *S. maxima* ; *S. aspera*, revised diagnosis, distribution, *S. antarctica* ?=*S. thompsoni*, FOXTON ; *S. cylindrica* see *Weelia c.* ; *S. democratica* see *Thalia d.* ; *S. echinata* partim=*S. aspera*, partim=*S. thompsoni*, FOXTON ; *S. flagellifera*, FOXTON, W. Africa, DEKEYSER ; *S. fusiformis*, BERRILL, revised diagnosis, distribution, partim=*S. aspera*, FOXTON, British Isles, annual cycle, GLOVER & BARNES (1, 2), N.E. Atlantic, BARNES, COLEBROOK *et al.*, CORLETT, FRASER (1, 3, 4), KUSMORSKAYA, PAVSHTIKS & GRUSOV, Singapore, WICKSTEAD, Antarctic, BUNT ; *S. f. aspera* partim=*S. aspera*, partim=*S. thompsoni*, FOXTON, ecology, New Zealand, BARY ; *S. f. echinata*, partim=*S. aspera*, partim=*S. thompsoni*, *S. f. gerlachei*=*S. gerlachei*, FOXTON ; *S. f. typica*, W. Africa, DEKEYSER ; *S. gerlachei* **sp. nov.** Pacific Sector of Southern Ocean, high latitudes, FOXTON pp. 13–15 text-fig. 2 ; *S. magalhanica* see *Ihlea m.* ; *S. maxima*, BERRILL, FOXTON, W. Africa, DEKEYSER ; *S. m. tuberculata*, FOXTON ; *S. mucronata*, FOXTON, see also *Thalia m.* ; *S. runcinata*=*S. fusiformis*, FOXTON ; *S. thompsoni* **sp. nov.** Southern Ocean, circumpolar, FOXTON pp. 11–13 pl. 2 ; *S. zonaria* see *Iasis z.*

Thalia democratica, BERRILL, CORLETT, FOXTON, phylogeny of pharynx, STERBA, annual cycle, British Isles, GLOVER & BARNES, unusually abundant off Scotland, 1958, FRASER (4), N.E. Atlantic " oceanic " distribution, BARNES, COLEBROOK *et al.*, *Sapphirina nigromaculata* as commensal, BARNES, Singapore, WICKSTEAD, ecology, New Zealand, BARY ; *T. d. orientalis*, *T. longicauda*, FOXTON ; *T. mucronata*, W. Africa, DEKEYSER.

Weelia see also *Salpa* ; *W. cylindrica*, W. Africa, DEKEYSER.

Class LARVACEA

Oikopleuridae

Coecaria see *Oikopleura*.

Folia gracilis, Antarctic, TOKIOKA (2).

Megalocercus huxleyi, Malaysia, WICKSTEAD.

Oikopleura sp. effects of midnight sun on vertical distribution, DIGBY, Moray Firth, FRASER (2), reinvasion of N.W. North Sea, GLOVER & BARNES, in top 5 cm of Black Sea, ZAITSEV ; *O.* spp. Malaysia, WICKSTEAD ; *O. cophocerca*, Black Sea (Bulgaria), VALKANOV ; *O. dioica*, annual cycle, FENAUX (2), S. Baltic, MANKOWSKI, bathymetric distribution, Adriatic, VUČETIC, Liberia to Angola, DEKEYSER, ecology, Japan, HIROTA, ecology, New Zealand, BARY ; *O.* (*Vexillaria*) *drygalski*, Antarctic, *O. falklandica*, **nom. nud.**, *O. frigida*, **nom. nud.**, TOKIOKA (2) ; *O. fusiformis*, annual cycle, FENAUX, Liberia to Angola, DEKEYSER, ecology, New Zealand, BARY, Antarctic, TOKIOKA (2) ; *O.* (*Vexillaria*) *gaussica*, Antarctic, TOKIOKA (2) ; *O.* (*V.*) *labradoriensis*, Arctic, TOKIOKA (2), Shetlands, predated by fish, FRASER (4) ; *O. longicauda*, annual cycle, FENAUX (2) ; Sierra Leone to Angola, DEKEYSER, New Zealand, BARY, Antarctic, TOKIOKA (2) ; *O. magellanica*, **nom. nud.**, *O. meteori*, **nom. nud.**, *O. oblonga*, **nom. nud.**, *O. parva*, *O. rigata*, **nom. nud.**, TCKIOKA (2) ; *O. rufescens*, Ghana, Dahomey, DEKEYSER, New Zealand, BARY ; *O. simplex*, **nom. nud.**, *O.* (*Vexillaria*) *valdiviae*, Antarctic, TOKIOKA (2) ; *O.* (*V.*) *vanhoeffeni*, food of herring, Norwegian Sea, LIE, Arctic, TOKIOKA (2).

Pelagopleura australis, *P. magna*, Antarctic, TOKIOKA (2).

Sinisteroffia scrippsi, Antarctic, TOKIOKA (2).

Stegosoma conogaster, New Zealand, BARY ; *S. magna*, Antarctic, TOKIOKA (2).

Vexillaria see *Oikopleura*.

Fritillariidae

Acrocercus see *Fritillaria*.

Appendicularia sicula, Sierra Leone, DEKEYSER, Antarctic, TOKIOKA (2) ; *A. tregouboffi*, FENAUX (3),

Eurycercus see *Fritillaria*.

Fritillaria sp. Gulf of Riga, NIKOLAEV & KRIEVS, Antarctic, BUNT ; *F. aberrans*, FENAUX (3) ; *F. a. antarctica*, *F. abjornseni*, Antarctic, *F.* (*Acrocercus*) *antarctica*, Antarctic, *F. arafoera*, TOKIOKA (2) ; *F.* (*Eurycercus*) *borealis*, annual cycle, FENAUX (2) ; *F. b. allongata*, Antarctic, *F. b. typica*, bipolar, TOKIOKA (2) ; *F. b. truncata ritteri*, *F. b. ritteri*, both Malaysia, WICKSTEAD ; *F. charybdae*, FENAUX (3) ;

F. (*Acrocercus*) *drygalski*, Antarctic, TOKIOKA (2) ; *F. fagei* **sp. nov.** Villefranche (Mediterranean), FENAUX (3) pp. 147–148 figs. 1–3 ; *F.* (*A.*) *formica*, Antarctic, TOKIOKA (2), W. Africa, DEEKYSER ; *F. fraudax*, Antarctic, TOKIOKA (2) ; *F. haplostoma*, variability, TOKIOKA (2), ecology, Japan, HIROTA, Sierra Leone, DEKEYSER ; *F. megachile*, Antarctic, TOKIOKA (2) ; *F. pellucida*, annual cycle, FENAUX (2), role of pylorus in feeding, FENAUX (1), Malaysia, WICKSTEAD, Antarctic, TOKIOKA (2) ; *F. scillae*, Antarctic, *F.* (*Eurycercus*) *tenella*, Antarctic, TOKIOKA (2) ; *F. urticans*, FENAUX (3) ; *F. venusta*, Antarctic, TOKIOKA (2).

Kowalevskaiidae

Kowalevskaia tenuis, Togoland, DEKEYSER, Antarctic, TOKIOKA (2).

Class CEPHALOCHORDATA

and origin of vertebrates, VANDEL.

Branchiostomatidae

Amphioxides ? pelagicus, larvae, Singapore, WICKSTEAD.

Amphioxus see *Branchiostoma*.

Asymmetron, nervous system, BONE.

Branchiostoma [as *Amphioxus*], MONNIOT, VANDEL, photographs, NILSSON & JÄGERSTEN, structure of photoreceptor, W. H. MILLER, use as indicator of oceanic currents, WEBB ; *B.* sp. ecology, N. Mozambique, KALK ; *B. belcheri*, ecology, distribution, Thailand, PIYAKARNCHANA & VAJROPALA, distribution by ocean currents, WEBB, larvae in plankton off Singapore, WICKSTEAD ; *B. b. tsingtauense*, embryology, TUNG *et al.* (1, 2) ; *B. caribaeum* adult taken in mid-water plankton off Louisiana, DAWSON, ultrastructure of muscle, PEACHEY (2) ; *B. lanceolatum*, atrial nervous system, BONE, ecology, English Channel, HOLME, CABIOCH, histochemistry of gut, GERZELI, polyphenols in collagen, MONNÉ, structure and ultrastructure of skin, OLSSON, chromaffinoma, STOLK, Black Sea (Bulgaria), VALKANOV, distribution by ocean currents, WEBB, ultrastructure and function of muscle, ZAPF & MOHAMED (1, 2) ; *B. malayana*, WICKSTEAD, ecology, distribution, Thailand, PIYAKARNCHANA & VAJROPALA.

Epigonichthys cultellus, ecology, distribution, Thailand, PIYAKARNCHANA & VAJROPALA.

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